THE

JOURNAL OF GEOLOGY

OCTOBER–NOVEMBER, 1905

FERDINAND, FREIHERR VON RICHTHOFEN

BORN MAY 5, 1833; DIED OCTOBER 6, 1905

BY BAILEY WILLIS
Washington, D. C.

Ferdinand von Richthofen is best known in the countries other than his fatherland as the explorer of China, and the author of the theory of the origin of the eolian loess deposits. In Germany his dominant personality carried his influence into many affairs not immediately connected with the sciences of geography and geology, in which he was a specialist. In him the emperor has lost a well-informed and conservative counselor.

Von Richthofen first took up geological work in connection with the *Wiener Reichsanstalt* in 1856, at the age of twenty-three. His earliest publications relate to the structure of the Tyrolean Alps, and the occurrence of certain igneous rocks. In 1860 he was appointed attaché for scientific studies with the Prussian expedition of Graf von Eulenberg to China, a diplomatic mission reinforced by four men-of-war, its object being to persuade the Chinese to enter into treaties with the German powers. Two years passed in diplomatic negotiations, during which the eager explorer found little opportunity to penetrate beyond the coast line of the unknown land; but he availed himself of a voyage made by one of the frigates among the East India islands to visit Formosa, the Philippines, Celebes, and Java. He also made excursions into Siam and farther India.

When the embassy returned, von Richthofen remained in the East, in accordance with the original resolution with which he had left Europe, to solve some problem of broad bearing with reference to the Asiatic continent. His early plans were thwarted, and he finally made a voyage to San Francisco, whence he extended his travels through California and Nevada. Years had passed since he left home, and his original purpose remained unaccomplished, but unshaken, when on New Year's, 1867–68, he discussed with Professor J. D. Whitney those regions of the world of which geological studies were most needed. They agreed that China was, in view of its civilized state and general relations, the land which promised the richest results, and, in spite of the gigantic dimensions of the problem, von Richthofen determined to devote his energies to a study of that country for a number of years. He proposed to himself to explore, with individual resources, a land one-third larger than the United States, of which there were no maps more useful than rude Chinese sketches, and regarding which there was no scientific literature. Although China had been traversed by missionaries for centuries, and in the beginning of the eighteenth century the Jesuit fathers had determined the astronomical positions of nearly all the principal cities of the empire, our ideas of its geography were still an assemblage of myths. The conditions of investigation among a superstitious and unfriendly people, of whose language he was ignorant, might well, even under ordinary circumstances, have deterred the explorer, and they were at this time peculiarly unfavorable in consequence of the Tai-ping rebellion, and of the Mohammedan rebellion in the northwest provinces. Casting about for a companion, who might act as servant and interpreter, von Richthofen found it impossible to secure a Chinese of sufficient education who would submit to the hardships of such a journey as he proposed. There was at the moment in Shanghai a Belgian, Paul Splingaert, who, having killed a Chinese, was on trial and liable to sentence of death. Von Richthofen believed that the act was justified by attendant circumstances, and proposed that the man, who was accomplished in the Chinese dialects, should be released to accompany him. The authorities, being quite willing to yield the responsibility of his execution to some mob of the interior, agreed, and during four years Splingaert was von

Richthofen's constant and loyal companion. Von Richthofen gives him great credit for the success of the expeditions, and no doubt with justice, since the interpreter holds the fate of a party in the hollow of his hand.

With an appropriate sense of caution which, coupled with courage, resolution, and a strict sense of justice, was the basis of his success among the Chinese, von Richthofen made his first journeys by water on the Yang-tzï below Hankow, and the canals and lagoons of its lower course. His third journey was an extended one, by land, through the province of Shan-tung, and it is perhaps not too much to say that during the six weeks he spent there in the spring of 1869 he laid the foundations for the occupation of the peninsula by the Germans, who have developed their enterprises closely along the lines foreshadowed in his geological reports. From Shan-tung he proceeded to the Liau-tung peninsula, which he traversed as far as the borders of Korea, and, returning via Mukden, he reached Peking. The traveler was now reluctantly brought to consider the necessity of returning home, when through the efforts of Mr. Alexander Cunningham, head of the American house of Russell & Co., the Chamber of Commerce at Shanghai became interested in his explorations and undertook to support them. Having made a short trip, which he calls his fourth journey, through Kiang-si and Chö-kiang, von Richthofen began to prepare for the fifth journey, during which he traversed China from south to north, from Canton to Peking, and passed through a number of provinces where the population was believed to be peculiarly inimical to foreigners, and where he was a pioneer. His route from Canton to Hankow, on the Yang-tzï, was that afterward followed by the American engineer, Parsons, and that along which the proposed North-South Trunk Railway of China is to be built. Northward from Hankow he traveled by the Han River to the western margin of the great plains, and thence followed the foothills northward to the Yellow River. After crossing the latter he turned westward into the mountainous province of Shan-si, the province of great coal resources, and pursued thence the imperial highway to Peking. This journey occupied five months, from January to May, 1870. It was an enterprise of the highest daring, and one which yielded a rich treasure of observations in geography, geology, and the natural resources of the country.

Within three weeks of his arrival in Peking von Richthofen was prepared to undertake a still greater journey than the last, into the far southwestern provinces of China, but the massacre of Tientsin checked his plans, and, receiving news of the war between France and Germany, he was again about to return home. He realized, however, that he must arrive too late to be of material service to his country, and finally decided on a journey in Japan, where he became intensely interested in the varied features of that delightful little country. He says:

> I parted from it with regret, and yet I returned with joy to my work in China. For only after I had realized the smallness of the features of that land [Japan] did I become aware of the greatness with which every problem is presented in China. China lacks all of those charms which delight the traveler in Japan. One's mood becomes earnest, the conditions of life are unpleasant, but one's view is widened, and gigantic problems rise before us, of equal importance for the past, the present, and the future.

In this expression we have a suggestion of the spirit of the man, who had early set himself a task beyond the strength of most men, and who rejoiced as he realized its immensity.

His sixth journey in China was undertaken to fill out the months until the climatic conditions should be favorable for the trip to the far western provinces, and was an excursion which occupied some weeks in midsummer, 1871. Late in October he left Peking for his greatest and last journey through northern China, Mongolia, and central China, to the heart of Ssï-ch'uan. His intention of proceeding to Thibet was there thwarted, and, being near the end of his ready money and remote from any point at which he could replenish his purse, he was obliged to return, via the Yang-tzï River, along the route followed a score of years earlier by Abbé Huc.

In December, 1872, after an absence of twelve years, von Richthofen returned to Germany. In 1873 he was elected president of the Geographical Society of Berlin, an office which he also held from 1903 to the time of his death. During the years 1879–83 he was professor of geology at the University of Bonn. From 1883 to 1886 he was professor of geology and physical geography at the University of Leipzig, and in 1886 became professor at the University of Berlin. He was director of the Geographical *Anstalt*, and of the *Museum für*

Meereskunde; and 1903–04, rector of the University of Berlin, a position of honor conferred only upon the most distinguished.

Von Richthofen's scientific activity covered half a century, we may almost say the half-century of geological progress. He himself never stood still, but, advancing, welcomed newly discovered facts, was receptive to fresh ideas. In a letter received from him shortly before his death, he writes:

> Die Anschauungen wandeln sich; die Art, die Dinge zu sehen und zu beurtheilen wird eine andere, bei der Allgemeinheit und bei dem Einzelnen.

And, referring to recent investigations in parts of China which he had described, he says:

> Niemand wird mehr Freude daran haben als ich selbst, auch wo sie mich berichtigen und ergänzen. Ich begrüsse diese Berichtigungen, welche 33 bis 34 Jahren nach meiner einsamen Wanderung in dem damals noch verschlossenen Land gemacht werden.

His contributions to science are characterized by the qualities which distinguish him as an explorer of unknown lands: capacity for painstaking and detailed observation, combined with a broad grasp of his subject, and a daring conception of ideas. His ability to observe and to present his observations in a striking manner is exemplified in his reports on the geology of the Tyrolean Alps, which were written before he was twenty-seven. They are important works, illustrated with many studies of intricate structure, and they show a thorough comprehension of the best methods of geological study and presentation. These methods reappear in his great work, *China.* Upon the internal literary evidence it would be easy to determine that the early papers and the later volumes were written by one and the same hand, even though the name of the author had remained unknown.

Volumes I and II of *China* are by himself; the first deals with the geography of China and central Asia, and presents initially a description of the regions from the standpoint of our knowledge at the time it was written, 1873–76, and, secondly, an account of the development of intercourse between Europe and China since the legendary period of 1122 B. C. The latter subject is discussed through study of Chinese works, of which von Richthofen made extensive use. The book also contains the discussion of the loess,

its characteristics and mode of formation. Volume II of *China* is the statement of his observations in the northern provinces, together with the systematic treatment of the material according to geological systems and periods.

Volume III, which was to contain a similar discussion of his observations in the southern provinces, and which would, no doubt, have presented, in a revised form, his views on the systematic questions involved, remains unfinished. Volume IV, "Paleontologie," prepared by the specialists to whom his collections were referred, appeared in 1883.

Von Richthofen's field-work in China and the principal publication of results fall within the decade 1868–77, contemporaneously with the Fortieth Parallel Survey, and there is much besides the coincidence of period to invite a comparison. Each entered a *terra incognita* marvelously rich in geological facts, displayed on a grand scale; each reaped a magnificent harvest, and that gathered by von Richthofen's individual efforts is worthy of a place beside that of his American colleagues; and each elaborated some theoretical views, which the science has outgrown. But though modern research may find much to correct in their early labors, it owes its opportunity to these pioneers; it should not forget the conditions under which they worked; and it should be prepared for the advance which science is making, always ready to say in the words of von Richthofen: "I welcome these corrections."

There is perhaps no better illustration of von Richthofen's method of attacking a problem than the development of his theory of the loess, of which he has given a full account in his various articles upon the subject. He enumerates the extraordinary conditions of its occurrence in China, which seem to preclude its formation by any of the agencies usually invoked to explain the deposition of sediments, and states that as early as his first journey through Shan-si he conceived the hypothesis of deposition by wind under the climatic and geographic conditions of the steppes of central Asia. His later work upon the subject was directed to critical investigation of the regions in which a similar process is now going on, and he was fortified in his view at every step by the close analogy between the deposits of the desert basins and those of the loess-covered districts. He did not

shrink from attributing to a generally neglected agency, the wind, effects which are not only actually stupendous, but which he himself overestimated. He pursued the phenomena of the loess districts into the minutest details, and found ingenious and consistent explanations for the most puzzling peculiarities. His views were accepted by those who were most familiar with the loess of Asia, and there is no doubt that they must always constitute a principal part of any explanation of the phenomena. If they be modified, it will be through recognition of the fact that great changes have taken place in the mountain and river systems of China during and since the epochs of the loess.

Von Richthofen's latest contributions consist of four papers, entitled: "Geomorphological Studies of Eastern Asia." In these he pursues the method with which, in his earlier work, he boldly sketched the mountain ranges of China far beyond his field of observation, on the basis of the strike of geological formations; but he enlarges his field from orogenic to epeirogenic problems, and discusses the relations of the great highlands of Asia to the lowlands of its eastern coast and the curving chains of islands which inclose the adjacent seas. These problems are closely related to those to which Suess has devoted his life-work in the search for the *Hauptstruktur-Linien* of the earth, and they are intimately connected with fundamental questions of continental equilibrium and volcanic eruption. The articles are the fruit of the broadest knowledge of the geographical facts and of the most earnest lifelong study of the stupendous phenomena which Asia as a continent presents. They are the last work of the master of the subject.

Von Richthofen was a man of large stature and fine appearance, one who knew well the respect due to scholarship and the dignity of his own position. On occasion his grave courtesy expressed that dignified reserve which marks the deep thinker and the doer of great things. His life had been spent in consideration of large problems not only of science, but of nations and of humanity. His powerful intellect had grown with profound thinking, and in discussion one felt its grasp and penetrating force. But his heart also had grown great with experience, and his natural kindliness led him ever to consider others before himself. He was not only a great man, he was a man to love and honor.